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Health at a Glance

Prostate cancer trends in Canada, 1995 to 2012

by Lawrence Ellison

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. not available for any reference period
.. not available for a specific reference period
... not applicable
0 true zero or a value rounded to zero
0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p} preliminary
^{r} revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E} use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)

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Prostate cancer trends in Canada, 1995 to 2012

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Highlights

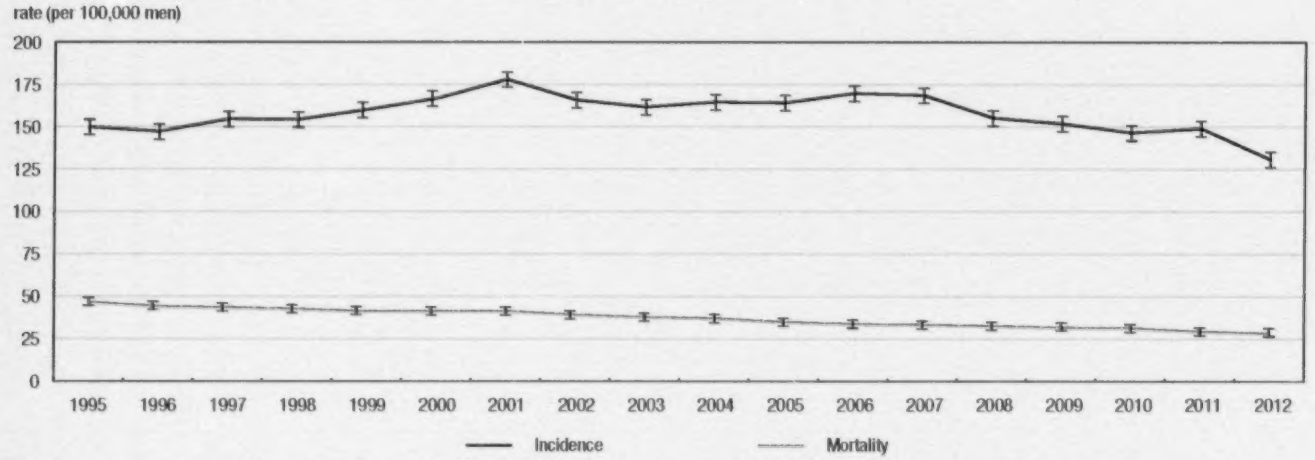
- Among males in Canada, prostate cancer is the most commonly diagnosed cancer and the third leading cause of cancer death, behind lung and colorectal cancers.
- The rate of newly diagnosed cases of prostate cancer increased by an average of 1.1% per year from 1995 to 2006 and then decreased by an average of 3.8% per year from 2006 to 2012.
- The rate of deaths from prostate cancer decreased by an average of 2.9% per year from 1995 to 2012. This corresponds to a 41.0% decline in the rate over this period.
- From 1995 to 2012, the median age at diagnosis for prostate cancer decreased from 71 to 67, while the median age of prostate cancer death increased from 78 to 82.

Among males in Canada, prostate cancer is the most commonly diagnosed cancer and the third leading cause of cancer death, behind lung and colorectal cancers. With an estimated 21,105 new cases, prostate cancer accounted for 23.4% of all cancer cases diagnosed among males in 2012.[1] In that year, 9.5% (3,708) of all cancer deaths among men were from prostate cancer.

The prostate gland, which is part of the male reproductive system, is involved in producing semen.[2,3] The most significant factor that increases a man's risk of developing prostate cancer is older age.[2,3] Another well-established risk factor is a family history of the disease.[2,3]

This article presents national data on the annual rates of newly diagnosed cases of prostate cancer (incidence) and deaths attributed to this cancer (mortality) from 1995 to 2012. Trends in rates are presented for all ages combined and by age group. The age distribution of both prostate cancer incidence and prostate cancer mortality in 2012 is compared with corresponding data from 1995.

Chart 1
Age-standardized prostate cancer incidence and mortality rates, by year, Canada, 1995 to 2012



Note: 95% confidence intervals are denoted by vertical bars overlaid on the trend lines. They indicate the degree of variability in the estimates. Rates are age-standardized to the final postcensal estimates of the July 1, 2011 Canadian population.
Sources: Statistics Canada, 1995 to 2012, Canadian Cancer Registry and Canadian Vital Statistics – Death Database.

The PSA screening test

Screening for cancer can help save lives by detecting some types of cancer early, when the disease is more responsive to treatment. The PSA test is a blood test for a protein produced by the prostate called the prostate specific antigen. In general, the higher the PSA level the greater the chance that prostate cancer is present.

Coinciding with the increasingly common use of the PSA test in the early 1990s, the annual rate of newly diagnosed cases in Canada increased by approximately 40% between 1990 and 1993, and then decreased by about 20% over the next two years.[4,5,12] While the PSA test can help detect prostate cancer early, its usefulness as a screening test has not been proven—it has not been shown to result in a reduction in all-cause mortality.[13,14]

For men who have symptoms associated with prostate cancer, the PSA blood test is one of the first tests that they are likely to undergo. The test is considered to be "an important part of monitoring prostate cancer during and after treatment."[15]

The data sources are the Canadian Cancer Registry (1995 to 2012), the Canadian Vital Statistics – Death Database (1995 to 2012) and population data, all from Statistics Canada.

Rate of newly diagnosed cases declining in recent years

The age-standardized incidence rate of newly diagnosed cases of prostate cancer decreased by 12.3% in 2012 from the year before. (Chart 1) The decline continues a trend towards increasingly lower prostate cancer incidence rates in recent years. From 2006 to 2012 the rate declined by an average of 3.8% per year. This followed an average increase of 1.1% per year from 1995 to 2006 (Table 1). Much of the peak in incidence in 2001 is considered to be because of intensified screening using the prostate-specific antigen (PSA) test , likely resulting in overdiagnosis.[4,5,6]

Prostate cancer incidence rates have also been declining over the last several years in the United States, but at a faster pace than in Canada. In particular, from 2011 to 2012, the rate in the United States decreased by 19.1%[7] compared with 12.3% noted for Canada. In the United States,

Table 1
Trends in prostate cancer age-standardized incidence and mortality rates, selected age groups, annual percent change (APC), Canada, 1995 to 2012

	Trend 1				Trend 2				Trend 3			
		Annual percent change				Annual percent change				Annual percent change		
			95% confidence interval				95% confidence interval				95% confidence interval	
Age group (years)	Period		from	to	Period		from	to	Period		from	to
Incidence												
All ages	1995 to 2006	1.1*	0.2	2.0	2006 to 2012	-3.8*	-5.6	-1.9	...	...	...	...
50 to 64	1995 to 2001	7.1*	5.2	9.1	2001 to 2007	1.7	-0.1	3.6	2007 to 2012	-3.6*	-5.2	-2.0
65 to 79	1995 to 2006	0.4	-0.6	1.4	2006 to 2012	-4.1*	-6.3	-1.8	...	...	...	...
80 and older	1995 to 2001	-1.3	-2.6	0.1	2001 to 2012	-3.5*	-3.9	-3.0	...	...	...	...
Mortality												
All ages	1995 to 2012	-2.9*	-3.1	-2.7	...	...	...	...	...	...	...	...
50 to 64	1995 to 2012	-3.6*	-4.1	-3.1	...	...	...	...	...	...	...	...
65 to 79	1995 to 2012	-4.2*	-4.6	-3.9	...	...	...	...	...	...	...	...
80 and older	1995 to 2004	-1.4*	-1.9	-1.0	2004 to 2012	-2.9*	-3.4	-2.4	...	...	...	...

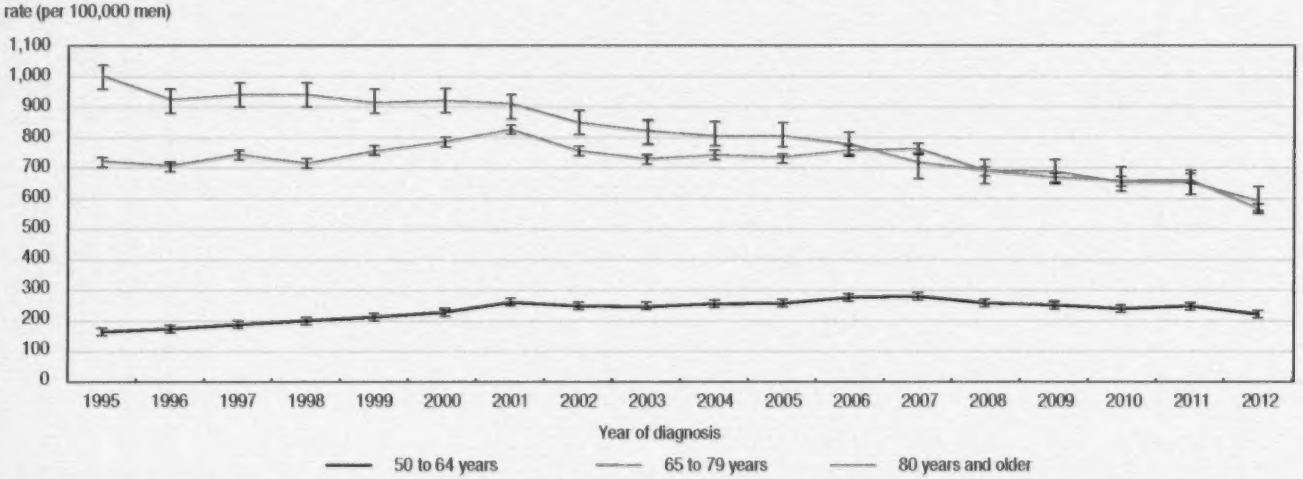
... not applicable
* the APC was significantly different from 0, indicating the presence of a statistically significant trend
Note: The APC represents the average percent change in age-standardized incidence/mortality rates in the given period. A positive APC indicates that the rate is generally increasing over time, while a negative rate indicates it is generally decreasing. In some instances, the overall picture is best described by multiple trends.
Sources: Statistics Canada, Canadian Cancer Registry and Canadian Vital Statistics – Death Database.

the decline in the rate for 2012 coincides with a significant drop in self-reported PSA screening rates, possibly related to revised guidelines released by the United States Preventive Services Task Force.[8,9,10]

Steady declines in mortality rate over entire study period

From 1995 to 2012, the age-standardized mortality rate of prostate cancer decreased by an average of 2.9% per year.

Chart 2
Age-specific prostate cancer incidence rates, by year, selected age groups, Canada, 1995 to 2012



Note: 95% confidence intervals are denoted by vertical bars overlaid on the trend lines. They indicate the degree of variability in the estimates. Rates are age-standardized to the final postcensal estimates of the July 1, 2011, Canadian population.
Source: Statistics Canada, 1995 to 2012, Canadian Cancer Registry.

This corresponds to a 40.9% decline in the rate over this period. In the United States, the mortality rate for prostate cancer decreased by 47.4% over this 17-year period.[7]

While both **screening** and improvements in treatment have played a role in the decrease, the overall impact of **PSA screening** on prostate cancer mortality is thought to be small.[3,4,11] The slope and timing of the decline in prostate cancer mortality—dating back to 1991[4]—suggest that it cannot be "attributed mainly to PSA screening."[4]

Incidence rate of prostate cancer decreased in all age groups in recent years

The decline in the incidence rate of prostate cancer in recent years occurred in each age group examined (Chart 2). Among men aged 50 to 64 at diagnosis, rates decreased by an average of 3.6% per year from 2007 to 2012 (Table 1). Similar decreases were observed since 2006 among those aged 65 to 79 and since 2001 among those aged 80 and older.

Prostate cancer death rates declining over time across age groups

From 1995 to 2012, the mortality rate from prostate cancer significantly decreased in each age group studied (Chart 3, Table 1). Decreases were similar among men aged 50 to 64 (3.6% per year on average) and 65 to 79 (4.2%). Among men aged 80 and older, the rate of decrease was faster between 2004 and 2012 (an average decrease of 2.9% per year)—approximately double the average yearly rate of decrease from 1995 to 2004.

Changes in age-specific incidence rates

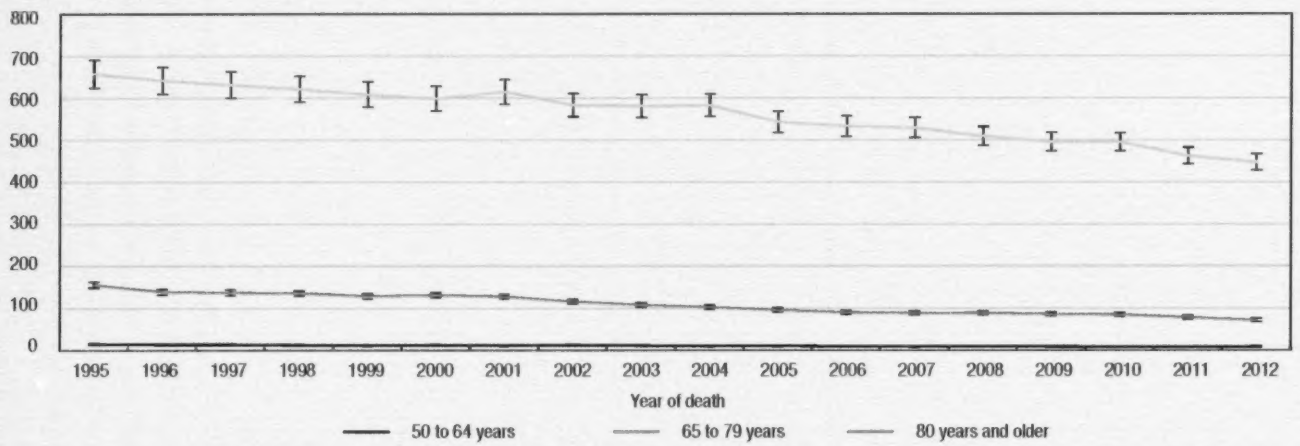
In 2012, the rate of newly diagnosed cases of prostate cancer increased steadily with age, from 6.3 per 100,000 men aged 40 to 44 to 556.9 per 100,000 men aged 65 to 69 (Chart 4).[16] Rates were relatively stable among older men, though an increase was seen between those in the 80-to-84 and 90-and-older age groups.

In comparison, the rates in 1995 were lower before the ages of 65 to 69, but continued to rise up to the ages of 85 to 89. Prostate cancer incidence rates were 40% to 44% lower among men in their 80s in 2012 than they were 17 years earlier. Prostate cancer was rarely diagnosed before the age of 40 in either period.

Prostate cancer diagnoses coming at younger ages

New prostate cancer cases in 2012 were diagnosed among younger men, as compared with new cases in 1995. The most common age at which men were diagnosed in 2012 was 64, whereas it was 69 in 1995. From 1995 to 2007,

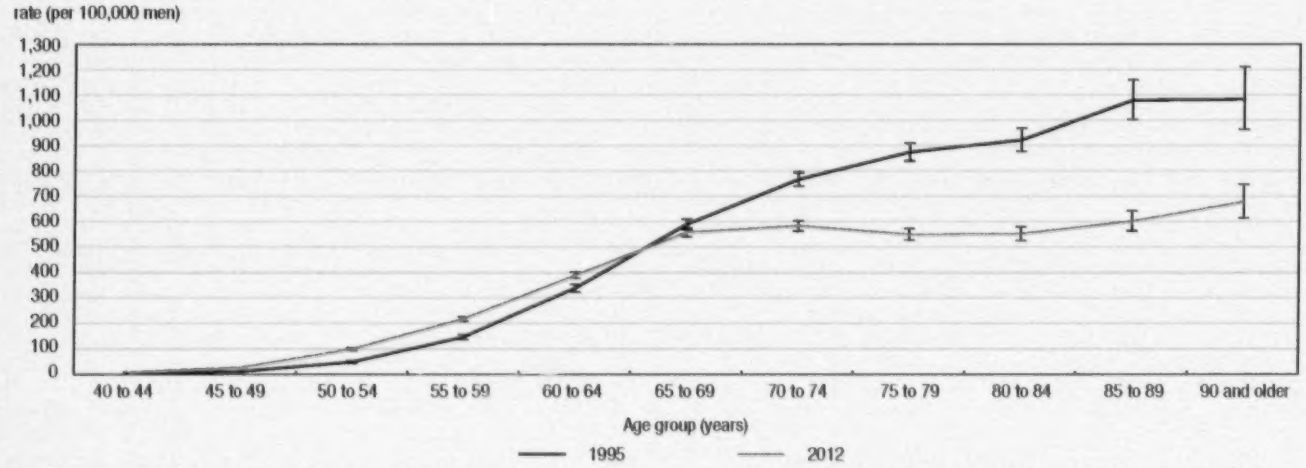
Chart 3
Age-specific prostate cancer mortality rates, by year, selected age groups, Canada, 1995 to 2012



Note: 95% confidence intervals are denoted by vertical bars overlaid on the trend lines. They indicate the degree of variability in the estimates. Rates are age-standardized to the final postcensal estimates of the July 1, 2011, Canadian population.
Source: Statistics Canada, 1995 to 2012, Canadian Vital Statistics – Death Database.

Chart 4

Age-specific prostate cancer incidence rates, ages 40 and older, Canada, 2012 versus 1995



Note: 95% confidence intervals are denoted by vertical bars overlaid on the trend lines. They indicate the degree of variability in the estimates. Rates are age-standardized to the final postcensal estimates of the July 1, 2011, Canadian population.
Source: Statistics Canada, 1995 to 2012, Canadian Cancer Registry.

the median[17] age at diagnosis decreased from 71 to 67 and remained so through to 2012. The median age of prostate cancer deaths in 2012 was 82, up from 78 in 1995 (data not shown).

Prostate cancer was generally diagnosed at older ages in Canada than in the United States. For example, 20% of all new prostate cancer cases in the United States were diagnosed at age 75 or older in the period from 2008 to 2012[7] whereas in Canada this figure was 25% (data not shown).

The median age at diagnosis of prostate cancer in the United States from 2008 to 2012 was 66; for deaths attributed to this cancer, it was 80.[7]

Summary

Prostate cancer incidence rates have been decreasing in recent years; from 2006 to 2012 the rate decreased by an average of 3.8% per year. From 1995 to 2012 the prostate cancer mortality rate decreased by an average of 2.9% per year. Mortality rates decreased at a faster pace among men aged 50 to 79 than among those aged 80 and older.

Men diagnosed with prostate cancer in 2012 were younger at diagnosis than they were in 1995, while deaths attributed to this cancer occurred at older ages in 2012, compared with 1995.

Data sources

The Canadian Cancer Registry is a dynamic, person-oriented, population-based database maintained by Statistics Canada. It contains information on cancer cases diagnosed from 1992 onward, compiled from reports from every provincial and territorial cancer registry in Canada. Cancer incidence data in this report are from the February 2016 tabulation master file. The analysis file was created using the multiple primary coding rules of the International Agency for Research on Cancer.[18] Cases were defined based on the International Classification of Diseases for Oncology, Third Edition.[19]

The Canadian Vital Statistics – Death Database includes demographic and cause of death information for all deaths from all provincial and territorial vital statistics registries in Canada. Prior to 2010, some data were collected on Canadian residents who died in some American states; these deaths were excluded from this analysis. Starting with the 2010 reference year, data on Canadian residents who died in American states are no longer collected. Mortality data in this report are from the December 10, 2015, release.

Incidence and mortality rates were derived using Canada's population estimates by age and sex.[20]

Methods

Classification of cases and deaths

Cancer cases were classified as prostate cancer if the topography (site) code was C61.9 and the histology code was within one of the following ranges: 8000- to 9049, 9056- to 9139 or 9149- to 9589. Only malignant cases were considered.

Deaths were classified using the World Health Organization's *International Statistical Classification of Diseases and Related Health Problems—10th Revision* (ICD-10)[21] for deaths from the year 2000 onward, and the 9th Revision (ICD-9)[22] for deaths from previous years. Deaths for which the ICD-10 code was C61 or the ICD-9 code was 185 were considered to be from prostate cancer.

Incomplete data

At the time of the analyses, cancer data for Quebec were not available beyond 2010. The 2010 data from this province were copied and used as a substitute for both 2011 and 2012. This approach was considered preferable to excluding Quebec data for these years because prostate cancer incidence in Quebec is not similar to that in the rest of Canada.[5,23]

Death certificate only cases had not been reported for Ontario since 2007 and for Quebec since 2009. In each instance, incidence data from the last year in which they were reported were repeated for subsequent years.

Trend analyses

All trend analyses were performed using the Joinpoint Regression Program of the Surveillance, Epidemiology, and End Results (SEER) Program and age-standardized rates.[24] Unless otherwise noted, the annual changes in age-standardized incidence and mortality rates reported in this article are the annual percent changes (APCs). If statistically significant changes in trends were detected in the study period, then multiple APCs were reported. The minimum time span on which to report a trend was set at five years. Thus, the most recent possible trend period in this study was 2008 to 2012. The critical level used to determine whether a given trend was significantly increasing or decreasing was set at 0.05.

Age-standardized rates were standardized to the final postcensal estimates of the July 1, 2011, Canadian population (see table below).

2011 Canadian standard population weights

Age group	Standard weight
0 to 4	0.055297
5 to 9	0.052717
10 to 14	0.055853
15 to 19	0.065194
20 to 24	0.068555
25 to 29	0.069006
30 to 34	0.067786
35 to 39	0.066188
40 to 44	0.069474
45 to 49	0.079199
50 to 54	0.078365
55 to 59	0.068518
60 to 64	0.059705
65 to 69	0.044636
70 to 74	0.033597
75 to 79	0.026769
80 to 84	0.020416
85 to 89	0.012426
90 and older	0.006299

Definitions

The age-standardized incidence or mortality rate represents the number of new cancer cases or deaths per 100,000 men that would have occurred if the population under study had had the same age distribution as the given standard population. Age-standardization allows for comparisons of incidence or mortality rates over time that are unaffected by changes in the age distribution of the population. All reported incidence and mortality rates were age-standardized.

Overdiagnosis refers to the detection of disease that would not progress to cause symptoms or death.[4,25]

Screening refers to testing to find a disease in people who don't have symptoms of that disease.[26]

References and notes

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Related material for this article

Related data tables

Statistics Canada. Table 103-0550. New cases of primary cancer (based on the August 2015 CCR tabulation file), by cancer type, age group and sex, Canada, provinces and territories

Statistics Canada. Table 103-0554. New cases and age-standardized rate for primary cancer (based on the August 2015 CCR tabulation file), by cancer type and sex, Canada, provinces and territories

Statistics Canada. Table 102-0522. Deaths, by cause, Chapter II: Neoplasms (C00 to D48), age group and sex, Canada

Data sources

Canadian Cancer Registry (CCR)

Canadian Vital Statistics – Death Database

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